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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/554,059	09/01/2006	Akira Otomo	32011-224744	7920

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EXAMINER	
WALTERS JR, ROBERT S	
ART UNIT	PAPER NUMBER
1792	
MAIL DATE	DELIVERY MODE
12/08/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/554,059	OTOMO ET AL.	
	Examiner	Art Unit	
	ROBERT S. WALTERS JR	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 August 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-35* is/are pending in the application.

4a) Of the above claim(s) *17-35* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10/24/2005* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *10/24/2005,9/13/2006,7/31/2009*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status of Application

Claims 1-35 are pending. Claims 17-35 are withdrawn. Claims 1-16 are presented for examination.

Election/Restrictions

Claims 17-35 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim.

Applicant's election of claims 1-16 in the reply filed on 8/26/2009 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claim Objections

Claim 6 is objected to because of the following informalities: Binding should be changed to bonding to be consistent with the rest of the claims. Appropriate correction is required.

Claim 15 is objected to because of the following informalities: Binding target should be changed to bonding target to be consistent with the rest of the claims. Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1, 2, 4, 5, 10 and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by McIntyre et al. ("Nanocatalysis by the Tip of a Scanning Tunneling Microscope Operating Inside a Reactor Cell").

Regarding claims 1, 2, 4, 5, 10 and 15, McIntyre teaches a bonding method (abstract) comprising:

(a) preparing a support (the STM microscope) having fixed thereon (on the tip) an intermediate excitation medium (the Pt-Rh tip) which is the same before and after excitation and after transfer of excitation energy or electrons (Figure 4);

(b) arranging said tip on said support so as to face at a specific distance a bonding residue (hydrogen) and a bonding target (the carbon clusters which are molecules, see Figure 4); and

(c) bonding said hydrogen with the carbon clusters in the vicinity of the tip which has been excited by voltage pulses (electrons, 5th paragraph) which then excites the hydrogen to achieve bonding (9th paragraph).

McIntyre further teaches that the bonding target is fixed on a platinum surface (fixing medium) and that the tip and platinum surface are positioned accurately enough to achieve bonding (see

Figure 4). McIntyre teaches all the critical limitations of claims 1, 2, 4, 5, 10 and 15, therefore McIntyre anticipates these claims.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

2. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over McIntyre in view of Ishino et al. (JP2001-277200).

Regarding claim 3, McIntyre teaches all the limitations of claim 2, but fails to teach preparing a support having a relief or uneven pattern, wherein the step of bonding uses only the excitation medium on the protruding parts of the relief. However, Ishino teaches preparing a support having an uneven pattern (Figure 3) and teaches applying energy to this support to transfer this pattern to a second substrate (0009-0010). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify McIntyre's process by preparing a support having an uneven pattern and exciting the pt-rh catatlyst such that it transfers the pattern of the support to the fixing member. One would have been motivated to make this modification as it would allow for careful transfer of a pattern to a substrate and allow for controlling reactivity in only desired regions.

3. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over McIntyre in view of Okawa et al. ("Nanoscale Control of Chain Polymerization").

Regarding claim 6, McIntyre teaches all the limitations of claim 5, but fails to explicitly teach accomplishing the bonding with an accuracy of 1 nm or less. However, Okawa teaches using an STM tip to induce and guide polymerization to a precision of 1 nm (1st paragraph). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify McIntyre's process to accomplish bonding to an accuracy of 1 nm, since

McIntyre's method similarly utilizes an STM tip and would be expected to be able to be controlled to the same resolution. One would have been motivated to make this modification as it would allow for higher resolution patterning and controlling reactivity on the platinum surface in McIntyre's process.

4. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over McIntyre in view of Lee et al. ("Single-Bond Formation and Characterization with a Scanning Tunneling Microscope").

Regarding claim 16, McIntyre teaches all the limitations of claim 1, but fails to teach the bonding target being a material other than a molecule. However, Lee teaches a similar process for bonding a molecule with a bonding target utilizing an STM tip (see Figures 1A-D). Lee further teaches the bonding being accomplished between a carbon monoxide molecule and an individual iron atom (not a molecule, see 3rd paragraph). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify McIntyre's process by utilizing bonding targets other than molecules. One would have been motivated to make this modification as it would allow controlling reactivity at the spatial limit of individual atoms allowing for extremely high resolution patterning.

5. Claims 1, 7, 8 and 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Costela et al. ("N-acetyl-4-nitro-1-naphthylamine as Sensitizer of N,N-dimethylaniline for Photoinitiated Polymerization") in view of Neckers et al. (U.S. Pat. No. 4315998).

I. Regarding claims 1, 7, 8, 10 and 11, Costela teaches a bonding method comprising arranging N-acetyl-4-nitro-1-naphthylamine (ANNA, an intermediate excitation medium which is the same before and after excitation, see left side of Figure 7) to face at a specific distance a bonding target (the monomer) and bonding residue (the same monomer) and bonding the monomers to form a polymer after excitation by exposure to light of ANNA and transfer of the energy from the ANNA to the monomer by excited triplet energy transfer (3rd paragraph and left side of Figure 7). Costela fails to teach preparing a support having ANNA fixed thereon.

However, Neckers teaches binding photosensitizing catalysts to a polymer support (abstract), and that these supported catalysts are effective in photoreactions (abstract). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Costela's process by preparing a support having ANNA fixed thereon. One would have been motivated to make this modification as Neckers teaches that having the catalyst on a support allows for easy separation of the catalyst from the reaction medium, such that it can be reused in additional reactions (column 2, lines 5-8).

II. Regarding claim 12, Costela in view of Neckers teach all the limitations of claim 11 including the method comprising utilizing N-acetyl-4-nitro-1-naphthylamine, but fails to teach using a derivative of this compound. However, it would have been obvious to one of ordinary skill in the art at the time of the invention that a derivative of N-acetyl-4-nitro-1-naphthylamine having the photosensitizing portion would operate similarly to how N-acetyl-4-nitro-1-naphthylamine does in photoreactions. Therefore, it would have been obvious to one of ordinary

skill in the art at the time of the invention to modify Costela in view of Neckers' process by utilizing a derivative of N-acetyl-4-nitro-1-naphthylamine in place of N-acetyl-4-nitro-1-naphthylamine. One would have been motivated to make this substitution as one having ordinary skill in the art at the time of the invention could have made this substitution with a reasonable expectation of success (see above), and the predictable result of catalyzing a bonding reaction.

6. Claims 1, 9, 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cermenati et al. ("Solar Light Induced Carbon-Carbon Bond Formation via TiO_2 Photocatalysis") in view of Ishibashi (U.S. Pat. No. 6211112).

Regarding claims 1, 9, 13 and 14, Cermenati teaches a bonding method comprising arranging a titanium dioxide photocatalyst to face at a specific distance a bonding target (ArCH2SiMe3) and a bonding residue (the alkene) and bonding said bonding residue to the bonding target by excitation of titanium dioxide (Scheme 1) which transfers electrons from titanium dioxide to the bonding residue after excitation by exposure to light (Formulas 1-4). Cermenati fails to teach preparing a support having fixed thereon the photocatalyst intermediate excitation medium.

However, Ishibashi teaches preparing a support having fixed thereon a photocatalyst (abstract) such as titanium dioxide (column 1, lines 66-67). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Cermenati's process by preparing a support having titanium dioxide fixed thereon. One would have been

motivated to make this modification as having the catalyst on a support would allow for easy separation of the photocatalyst from the reaction medium, such that it can be reused in additional reactions.

Conclusion

Claims 1-35 are pending.

Claims 17-35 are withdrawn.

Claims 1-16 are rejected.

No claim is allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ROBERT S. WALTERS JR whose telephone number is (571)270-5351. The examiner can normally be reached on Monday-Friday, 8:00am to 5:00pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr can be reached on (571)272-1414. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Michael Barr/
Supervisory Patent Examiner, Art Unit 1792

/ROBERT S. WALTERS JR/
December 3, 2009
Examiner, Art Unit 1792